DOCUMENT RESUME

ED 142 572 TM 006 379

AUTHOR Stallings, Jane A.
TITLE The Importance of Multiple Data Collection Instruments When Describing the Educational Process.
INSTITUTION Stanford Research Inst., Menlo Park, Calif.
PUB DATE [Apr 77]
NOTE 11p.; Paper presented at the Annual Meeting of the American Educational Research Association (61st, New York, New York, April 4-8, 1977)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Classroom Environment; Classroom Observation Techniques; *Data Collection; Effective Teaching; Elementary Secondary Education; Inservice Teacher Education; *Instruction; Interviews; *Measurement Techniques; Nonparametric Statistics; *Research Design; Research Needs; Student Behavior; Student Teacher Relationship

ABSTRACT

A complex research and development process is required to study instructional processes and student outcomes effectively. In order to study the instructional process it is essential to select or develop instruments that can describe a total event. Understanding the classroom process necessitates having a record of the environment, the materials, the interactions, and activities of the teacher and children. The first step in studying instructional process is to examine and specify the critical components of the classroom or the teaching program being studied. The next step is to identify or develop an observation instrument to record these critical components reliably. It is especially important to select appropriate statistical procedures since observation data often form J-shaped curves that defy analysis using conventional parametric procedures. (MV)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

STANFORD RESEARCH INSTITUTE
Menlo Park, California 94025 · U.S.A.

ED142572

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

THE IMPORTANCE OF MULTIPLE DATA COLLECTION INSTRUMENTS WHEN DESCRIBING THE EDUCATIONAL PROCESS

by

Jane A. Stallings, Ph.D.

CG 006 379

This paper was presented as part of a symposium on "Context-Based Research on Teaching: Problems and Promise" at the annual meeting of the American Educational Research Association, New York, New York, April 1977.

THE IMPORTANCE OF MULTIPLE DATA COLLECTION INSTRUMENTS WHEN DESCRIBING THE EDUCATIONAL PROCESS

The research that I find most compelling is the search for relationships between instructional processes and growth in the person receiving the instruction. Several studies have been conducted in the 1970s identifying instructional processes that can be validly related to outcomes for the learner. Most notable of these are Brophy and Evertson (1974), McDonald and Ellis (1976), Soar (1973), and Stallings and Kaskowitz (1974). When the findings of these studies are carefully analyzed, the results are seldom found to be contradictory, even though researchers have used different samples and different instruments.

It is now becoming possible to apply the findings of these researchers to teacher training. Such an effort is now being carried out at Stanford University under the direction of Nathan Gage.* The instructional techniques being developed are expected to produce specific student outcomes. However, this paper will be limited to the discussion of the complex research and development process that is required to study instructional processes and student outcomes.

To learn the most from a study of process, it is essential to select or develop instruments that can describe a total event. A classroom can be likened to a stage on which a play is taking place. The physical structure of the classroom is the setting for the play; the materials and equipment are the props. The scenes of the play, then, are the various activities and grouping of characters, and the plot consists of sequences of interaction between the teacher and the children and among the children themselves. All of the components are necessary to an understanding of

---

*Staff of the Program on Teaching Effectiveness
An Experiment on Teacher Effectiveness and Parent-Assisted Instruction in the Third Grade, Vol. 1 (Stanford University, Stanford, CA, 1977).

the play. Similarly, to comprehend the classroom process, it is necessary to have a record of the environment, the materials, the activities of the teacher and children, and the interactions that occur as they participate in the activities.

A first step in studying instructional process, then, is to examine and specify the critical components of the classroom or the teaching program being studied: what is the environment, what are the activities and groupings, and what interactions are taking place? The next step is to identify or develop an observation instrument to record the identified critical components reliably. For SRI's recent study of Follow Through (Stallings and Kaskowitz, 1974), we developed an observation instrument to record the critical components of seven Follow Through sponsors. We did this by visiting a model classroom of each sponsor in a specified city to obtain descriptions of the physical environment, the activities that occurred, the classroom management strategies, and the interactions between teachers and students. From the ethnographic recordings, we developed a coding system. The variables we developed from the coding system were sent to each sponsor to check whether the critical components of their model could be recorded in this system. Because one model had a traveling teacher (one who moved from child to child assisting and providing feedback), we had to develop a code to show when movement around the classroom occurred. Because another sponsor directed teachers to give tokens for correct responses to questions about the subject matter, we had to provide a code to indicate when a token was given along with praise for the correct response. Fortunately for the project, we were able to collect data and refine our observation system over four data collections in four years. Each year we were able to identify those variables that distinguish sponsors from each other, to identify codes that were unreliable and redefine or delete them, to improve the training procedures, to select a large enough sample to assure a wide range of process and outcome scores, to develop an efficient data processing system, and to select appropriate statistical procedures.

This last point is very important because observation data can not be treated like test data. Observation data often form J-shaped curves

that defy analysis using conventional parametric procedures. For the Follow Through data, we used nonparametric procedures to examine program implementation of first and third grade classrooms in five different locations for each sponsor. These nonparametric procedures using quintiles are reported in Stallings SRCD Monograph (1975). The validity of the statistical procedures for examining implementation was borne out in the following way. The Behavioral Analysis Model at University of Kansas had the first and third grade classrooms receiving very similar implementation scores on their set of variables in four out of five of their model cities. Director of the program, Don Bushell, was asked about the teachers or training in the variant city. The question was: were the observers reporting inaccurate data or were the teachers in that city truly different from the teachers in the other four cities? Bushell's response was that the particular teachers in our sample for that city had not reached the required proficiency and were therefore not yet credentialed for his program. The teachers in the other four cities had achieved proficiency and were credentialed by Bushell. Thus, one could conclude the observation system was reporting accurate information about the Bushell program and that the statistical procedures being used were appropriate for measuring implementation. Two other sponsors also reported agreement on their instruments with the SRI data for specific classrooms which were not well implemented.

Other information about implementation comes from the teachers themselves. We had teachers rate themselves on a 44-point scale of structure and flexibility, and we found the teachers' self-ratings similar to our observations of structure. For example, teachers who were observed to emphasize subject matter also rated themselves high on this item. A more substantial method of examining teacher report of implementation is that developed by Gene Hall (1976). In Hall's work, the six levels of implementation are defined through interviews. These levels can then be correlated with student growth. Gene Hall and Susan Loucks are currently conducting a study of a mathematics curriculum in Denver, Colorado, and they are using the Hall teacher interview and the Stallings/SRI observation system to assess levels of implementation. It will be of great

interest to see how teacher self-report data confirm or contradict observation data on how fully the curriculum is being implemented.

Outcomes

Once the program to be assessed has been defined and the instruments have been developed or selected, the next step is to examine what effect the instructional processes have on the learner. Historically, the primary outcomes for learners have been standardized achievement test scores. However, during the 1960s and 1970s, many educational programs were aimed at educating the whole child. To determine whether specific programs are achieving their goals, social and emotional outcomes must be measured as well as cognitive outcomes. Unfortunately, measurement tools have not developed at the same rate as the educational programs. Schools have programs dedicated to developing curiosity, self-esteem, social awareness, group cooperation, problem-solving ability, the ability to plan, execute the plan, and evaluate the work, but researchers do not yet have satisfactory methods for evaluating the effectiveness of such programs.

In the Follow Through 1974 study, in addition to the Metropolitan Achievement Test, the third grade children were given the Raven's Progressive Matrices to assess nonverbal problem-solving ability, the Intellectual Achievement Responsibility Scale, and the Coopersmith Self-Esteem Inventory to assess how the child felt about himself. Absence rate was used as an indicator of attitude toward school, based on the assumption that children who like school are absent less often. To assess such variables as task persistence, question asking, and group cooperation, a random sample of children was observed. Since it is difficult to define such attributes as self-esteem or attitude toward school, it is important whenever possible to have several measures (observations, in addition to tests) of these interesting but elusive variables.

Correlation

In order to estimate the effect of the Follow Through sponsor's model, we used the score the children obtained on the Wide Range

Achievement Test when they entered school in kindergarten. Holding this score constant allowed us to examine the effect of the model over two years for the first grade and over four years for the third grades. These few tests left much to be desired in measuring important expected child outcomes in the Follow Through classrooms. However, test development is moving ahead and there are more tests available now than there were in 1973, when the Follow Through data were collected.

Since so little was known about how instructional processes are related to learner outcomes, we took the shotgun approach in the Follow Through observation evaluation and ran partial correlations using 340 process variables with each outcome measure. These analyses were conducted using classroom means for 108 first grades and 58 third grades. These classrooms exhibited a wide range of instructional processes and student outcome scores. Out of the 340 possible correlation, the numbers significant at the 0.05 level were 118 in reading, 114 in math, 58 in problem solving, and 65 in absence rate. The correlations were significant in both a positive and negative direction; that is, there were as many suggestions about what a teacher ought not to do as there were about what a teacher ought to do.

With so many significant findings, we attempted to refine these through a stepwise regression that could identify the smaller set of variables that accounted for most of the variance. This procedure worked well in that the entering school ability of the children was accounted for first, allowing us to examine the variance in test scores explained by the process variables. We found that as much (or more) of the test score variance was explained by the instructional processes as by entering ability. Those processes contributing the most to the explanation included variables describing grouping, organization, curriculum, and instructional interactions. Because the total classroom environment was observed and recorded, a more complete picture of what is important to classroom instruction could emerge.

For example, I think other studies of reading, which have not found a significant relationship, have addressed single dimensions such as

curriculum, or the 45-minute formal reading period, or grouping patterns, or individualization. Analyses of single program components are too limited in their view. Instructional learning occurs in the context of a living environment. It is not just the materials that affect the learners; it is how the materials are used. It is not just the length of time spent in the formal reading period, but how much actual time each child spends in the act of reading all day. It is not just how teachers group children, but how teachers manage the groups to keep all children working on their tasks for the maximum amount of time.

A current research study at SRI is allowing us to study basic reading skills taught to junior high and high school students. This time we may not need to use a 12-gauge shotgun. We know a little more of what to look for. We can form hypotheses based upon prior research. We shall examine time spent on task, length of period, number of teachers and aides, class size, classroom management, individualized curriculum, instructional patterns, classroom control, positive or negative affect. All of these are variables identified as being related to child learning in the research of Brophy and Evertson (1974); McDonald (1976), Wiley (1975), and Stallings and Kaskowitz (1974). We shall still take some exploratory shots in our hunting expedition, because at the upper school level we expect that self-esteem, peer pressure, and absenteeism is likely to have a greater effect on the learning-to-read process. We are eager to explore this unknown area and find what instructional processes are related to achievement, self-esteem, and absenteeism at this level. To do this we shall compute partial correlations, using the instructions process variables and the outcomes of interest. Any piece of the puzzle we may identify that contributes to the picture of effective teaching and learning can form the basis for hypotheses for more carefully controlled experiments where teachers are taught to use the processes identified as beneficial to student learning. We will use several instruments to examine our hypotheses about the classroom process at the junior high school level. These include the Comprehensive Test of Basic Skills (CTBS), the FIRO-B, the Student Classroom Environment Scale, the Student Rating of Teachers,

a Teacher Questionnaire, and a newly developed observation of interactions and classroom activities. These will allow us to study process and outcome from the point of view of the student, the teacher, and the observer.

In a sense this research is at the dawn--a few rays of light are coming across the horizon. We, the research community, have learned in the past that teacher characteristics such as age, education, experience, or SES, do not explain why some teachers are successful and others are not. We have learned that curricula alone do not explain why some children learn and others do not. We have learned that school level variables do not explain test score differences. We have learned that what teachers do in the physical setting of their classrooms--their instructional technique--does make a difference in what children learn. Our ability to measure instructional process and a variety of student outcomes is progressing. We can use several measurements--observation, interview, and tests--to check our findings. Since 1970, the way teachers and students are evaluated has been changing. To go forward, it is important for researchers in this field to share their findings. Whenever possible we should use common metrics and variables so that we can build a body of knowledge regarding instructional process and student growth. Research in this area has just begun, but it is a new day and we are all fortunate to be a part of this challenging work.

REFERENCES

Brophy, J. E., and C. M. Evertson, Process-product correlations in the Texas Teacher Effectiveness Study: Final Report, Research Report No. 74-4, Research and Development Center for Teacher Education, University of Texas, Austin, Texas (1974).

Hall, G., S. F. Loucks, W. L. Rutherford, and B. W. Newlove, "Levels of Use of the Innovation: A Framework for Analyzing Innovation Adoption," Journal of Teacher Education 26 No. 1, 52-56 (Spring 1975).

McDonald, F., and P. Elias, The Effects of Teaching Performance on Pupil Learning, Beginning Teacher Evaluation Study: Phase II, Final Report, Vol. 1 (Educational Testing Service, Princeton, N.J., 1976).

Soar, R., "Final Report, Follow Through Classroom Process Measurement and Pupil Growth (1970-1971)," Institute for the Development of Human Resources, University of Florida, Gainesville, Fla. (1973).

Stallings, Jane, "Implementation and Child Effects of Teaching Practices in Follow Through Classrooms," Monographs of the Society for Research in Child Development, Vol. 40, Nos. 7-8. (1975)

Stallings, J., and D. Kaskowitz, "Follow Through Classroom Observation Evaluation, 1972-1973, Office of Education Contract OEC-0-8522480-4633(100), Stanford Research Institute, Menlo Park, CA (1974).

Wiley, David E., "Another Hour, Another Day: Quantity of Schooling, A Portent for Policy," Report No. 3. Studies of Educative Process, University of Chicago, Chicago, Ill. (1973).

Measures for Use in Studies of Junior High and High Schools

Comprehensive Tests of Basic Skills (CTBS), CTB/McGraw-Hill, Del Monte Research Park, Monterey, CA 93940 (1975).

Schutz, Will, FIRO-B, Consulting Psychologists Press, 577 College Ave., Palo Alto, CA 94306 (1977).

"Secondary Observation Instrument," Stanford Research Institute, Menlo Park, CA 94025 (1977).

"Student Rating Scale of Instructor," Sequoia Union High School District, Redwood City, CA 94061 (1975).

"Teacher Questionnaire," Program on Teaching Effectiveness, Stanford Univ., Stanford, CA 94305 (1976).

Trickett, Edison J. and Rudolf H. Moos, Classroom Environment Scale, Form R, Consulting Psychologists Press, Inc., 577 College Avenue, Palo Alto, CA 94306.

Measures for Use in Studies of Elementary Schools

Crandall, Virgnia C., Walter Katkovsky, and Vaughn J. Crandall, "Children's Beliefs in Their Own Control of Reinforcements in Intellectual-Academic Achievement Situations," Child Development, Vol. 36, pp. 91-106 (1965).

Durost, W. N. et al., Metropolitan Achievement Tests (MAT) Form F (New York: Harcourt Brace Jovanovich, Inc., 1970).

"Follow Through Teacher Questionnaire," Stanford Research Institute, Menlo Park, CA 94025 (1972-1973).

Jastak, J. R., and S. R. Jastak, WRAT Manual (Wilmington, Delaware: Guidance Associates, 1965).

Raven, J. C., Raven's Coloured Progressive Matrices (New York: Psychological Corporation, 1956, 1962).

Stallings, Jane, "SRI Classroom Observation Instrument," Stanford Research Institute, Menlo Park, CA 94025.